IN THE SPECIFICATION

Amend page 1, line 1, the title, to read as follows:

METHOD OF MITIGATING TONER DAMAGE IN HIGH SPEED CONTACT DEVELOPING WITH END SEAL

Amend the paragraph beginning at page 1, line 7 and ending at page 1 line 11 to read as follows:

A common method of development with toner of an electrostatic image on a photoconductor roller (typically termed a drum) is by a developer roller moved in contact with the photoconductor roller. ~~drum.~~ The developer roller has toner applied to it and holds a layer of toner by electrostatic attraction. The developer roller rotates past a doctor blade, which may also have an electrical charge, and then contacts the rotating photoconductor roller.

Amend the paragraph beginning at page 1, line 18 and ending at page 1 line 22 to read as follows:

The friction of the developer roller moving against such a seal, which is essentially stationary, creates increased temperatures as printing speeds are increased by rotating the developer roller and the photoconductor roller ~~drum~~ faster. The temperatures become a serious technical concern when they rise to the point of melting or otherwise degrading the toner. The melting of toner will cause catastrophic failure of imaging.

Amend the consecutive paragraphs beginning at page 2, line 21 and ending at page 3, line 2 to read as follows:

Fig. 3 is a ~~is a~~ cut away sectional view showing the placement of the seal in a process cartridge, which is not novel in itself and is therefore labeled as prior art.

Fig. 4 is a side view of a ~~the~~ developer roller seal, a ~~the~~ developer roller, and a ~~the~~ photoconductor drum, cross-sectioned through a ~~the~~ seal to show the internal gap under the seal, with arrows showing motion.

Fig. 5 shows the developer roller with dotted outlines illustrating the weakened portions or gaps under the seals at each end.

Amend the consecutive paragraphs beginning at page 3, line 9 and ending at page 3, line 17 to read as follows:

A representative seal 1 employed in this invention is shown in Fig. 1. The front side of seal 1 has a curved portion 3, which conforms to the surface of the developer roller 5 (see Fig. 3) and a flat surface 7 which conforms to the surface of a doctor blade 9 (see Fig. 4). The front side of the seal has a region 11 with ridges to guide toner as described in detail in the foregoing patent 6,487,383 B2. The region 11 contacts the developer roller 5.

As shown in Fig. 2, the back side of the seal 13 forms a cantilever configuration with curved portion ~~side~~ 3 and flat surface 7 (Fig. 1). This provides a spring effect to press the front ~~font~~ side against the developer roller 5 and the doctor blade 9.

Amend the paragraph beginning at page 3, line 21 and ending at page 4, line 2 to read as follows:

As shown in Fig. 3, seal 1 is mounted between an edge of frame 20, to which the back side ~~backside~~ 13 of seal 1 conforms, and developer roller 5 and doctor blade 9. The edge of frame ~~Frame~~ 20 is part of a laser printer imaging device (not fully shown), and, more specifically, part of a toner cartridge (not fully shown) installed in a laser printer. Shown is one side wall 22 of a toner cartridge that forms a chamber for toner 24 (suggested by the dotted area) along with other walls of the cartridge (not shown).

Amend the consecutive paragraphs beginning at page 4, line 14 and ending at page 5, line 23 to read as follows:

As is standard the developer roller 5 and photoconductor roller 26 ~~two rollers 5 and 26~~ are rotated through a motor, shown illustratively as ~~an~~ element M, in the laser printer imaging device. The developer roller 5 and photoconductor ~~two rollers 5 and~~ 26 contact one another

while moving in the same direction at the location of contact, as shown by arrows in Fig. 4. Typically developer roller 5 is rotated marginally faster than the speed of photoconductor roller 26 to provide some rubbing action. This speed differential does not cause detrimental frictional heating.

When the speed of developer roller 5 is relatively high to achieve higher speed printing (more pages per minute), the frictional heating between seal 1 and developer roller 5 can be sufficient to melt toner 24 or otherwise seriously degrade toner 24. It is that effect which this invention mitigates.

Fig. 5 shows just the developer roller 5 in accordance with this embodiment. Except for gaps 30a and 30b on each end, developer roller 5 may be essentially as described in U.S. Patent No. 5,874,172 to Beach et al., which is assigned to the assignee of this invention. That developer roller of the foregoing Beach et al. patent has a core material corresponding to core material 5b that is a polycaprolactone ester polyurethane, having some polydiol with an outer layer, more-electrically-resistive-layer of oxidized polydiene. (The drawings of this application do not separately illustrate the outer layer of oxidized polydiene).

In accordance with this invention each end of developer roller 5 has gaps 30a and 30b ~~a gap~~ between shaft 5a and the outer body of core material 5b. These gaps 30a and 30b are only at the ends, which is located ~~location~~ where development by developer roller 5 is not employed.

Although gaps 30a and 30b are ~~a gap is~~ employed, it will be recognized that the air in gaps 30a and 30b ~~the gap~~ is not necessary to functioning so long as material in the gap is soft enough to allow added flexibility to the part of core material ~~body~~ 5a located under the seal 1 or other seal. For example, gaps 30a and 30b might be filled with a foam or a soft rubber-like insert.

Similarly, the configuration of the gaps 30a and 30b can take many shapes, all of which regulate the resulting stiffness of the core material 5b when it contacts the a seal 1. Gaps 30a and 30b increased in the longitudinal direction (in the direction of shaft 5a) have reduced stiffness because the cantilever effect is enhanced. Gaps 30a and 30b increased laterally (i.e., reducing the thickness of core material 5b under the seal 1, have reduced stiffness because of the reduced support material.

Accordingly, the interaction of heat produced and toner damage during operation can essentially define this invention. The invention requires areas of reduced support under the seal or seals. If during normal operation of an identical roller without the areas of reduced support the toner is damaged significantly by heat, then the roller with reduced support under the seal or seals is an implementation of this invention.

Amend the Abstract of the Invention, the paragraph beginning at page 7, line 2 and ending at page 7, line 4 (ignore the obvious clerical showing a 20 page number) to read as follows:

A developer ~~Developer~~ roller (5) is rotated rapidly for high speed printing, which can cause excessive heating at end seal (1). Heat damage to toner (24) is avoided by providing gaps (30a, 30b) under the seals (1) which reduce the stiffness of developer roller (5) and thereby reduce frictional heating.